

Mineral Assemblages

Zeolite facies

Main article: zeolite facies

The zeolite facies is the metamorphic facies with the lowest metamorphic grade. At lower temperature and pressure processes in the rock are called diagenesis. The facies is named for zeolites, strongly hydrated tectosilicates. It can have the following mineral assemblages:

In meta-igneous rocks and greywackes:

heulandite + analcite + quartz ± clay minerals

laumontite + albite + quartz ± chlorite

In metapelites:

muscovite + chlorite + albite + quartz

Prehnite-pumpellyite-facies

Main article: prehnite-pumpellyite facies

The prehnite-pumpellyite facies is a little higher in pressure and temperature than the zeolite facies. It is named for the minerals prehnite (a Ca-Al-phyllsilicate) and pumpellyite (a sorosilicate). The prehnite-pumpellyite is characterized by the mineral assemblages:

In meta-igneous rocks and greywackes:

prehnite + pumpellyite + chlorite + albite + quartz

pumpellyite + chlorite + epidote + albite + quartz

pumpellyite + epidote + stilpnomelane + muscovite + albite + quartz

In metapelites:

muscovite + chlorite + albite + quartz

Greenschist facies

The greenschist facies is at low pressure and temperature. The facies is named for the typical schistose texture of the rocks and green colour of the minerals chlorite, epidote and actinolite. Characteristic mineral assemblages are:

In metabasites:

chlorite + albite + epidote ± actinolite, quartz

In metagreywackes:

albite + quartz + epidote + muscovite ± stilpnomelane

In metapelites:

muscovite + chlorite + albite + quartz

chloritoid + chlorite + muscovite + quartz ± paragonite

biotite + muscovite + chlorite + albite + quartz + Mn-garnet (spessartine)

In Si-rich dolomite rocks:

dolomite + quartz

Epidote-Amphibolite-facies

Amphibolite-facies

Main article: amphibolite facies

The amphibolite facies is a facies of medium pressure and average to high temperature. It is named after amphiboles that form under such circumstances. It has the following mineral assemblages:

In metabasites:

hornblende + plagioclase ± epidote, garnet, cummingtonite, diopside, biotite

In metapelites:

muscovite + biotite + quartz + plagioclase ± garnet, staurolite, kyanite/sillimanite

In Si-dolostones:

dolomite + calcite + tremolite ± talc (lower pressure and temperature)

dolomite + calcite + diopside ± forsterite (higher pressure and temperature)

Granulite facies

Main article: granulite facies

The granulite facies is the highest grade of metamorphism at medium pressure. The depth at which it occurs is not constant. A characteristic mineral for this facies and the pyroxene-hornblende facies is orthopyroxene. The granulite facies is characterized by the following mineral assemblages:

In metabasites:

orthopyroxene + clinopyroxene + hornblende + plagioclase ± biotite

orthopyroxene + clinopyroxene + plagioclase ± quartz

clinopyroxene + plagioclase + garnet ± orthopyroxene (higher pressure)

In metapelites:

garnet + cordierite + sillimanite + K-feldspar + quartz ± biotite

sapphirine + orthopyroxene + K-feldspar + quartz ± osumilite (at very high temperature)

Ultra-High Temperature Facies

Blueschist facies

Main article: blueschist facies

The blueschist facies is at relatively low temperature but high pressure, such as occurs in rocks in a subduction zone. The facies is named after the schistose character of the rocks and the blue minerals glaucophane and lawsonite. The blueschist facies forms the following mineral assemblages:

In metabasites:

glaucophane + lawsonite + chlorite + sphene ± epidote ± phengite ± paragonite, omphacite

In metagreywackes:

quartz + jadeite + lawsonite ± phengite, glaucophane, chlorite

In metapelites:

phengite + paragonite + carpholite + chlorite + quartz

In carbonate-rocks (marbles):

aragonite

Eclogite facies

Main article: eclogite facies

The eclogite facies is the facies at the highest pressure and high temperature. It is named for the metabasic rock eclogite. The eclogite facies has the mineral assemblages:

In metabasites:

omphacite + garnet ± kyanite, quartz, hornblende, zoisite

In metagranodiorite:

quartz + phengite + jadeite/omphacite + garnet

In metapelites:

phengite + garnet + kyanite + chloritoid (Mg-rich) + quartz

phengite + kyanite + talc + quartz ± jadeite

Albite-epidote-hornfels facies

The albite-epidote-hornfels facies is a facies at low pressure and relatively low temperatures. It is named for the two minerals albite and epidote, though they are also stable in other facies. Hornfels is a rock formed by contact metamorphism, a process that characteristically involves high temperatures but low pressures/depths. This facies is characterized by the following minerals:

In metabasites:

albite + epidote + actinolite + chlorite + quartz

In metapelites:

muscovite + biotite + chlorite + quartz

In CALCAREOUS ASSEMBLAGE: Calcite + talc + quartz

Hornblende-hornfels facies

The hornblende-hornfels facies is a facies with the same low pressures but slightly higher temperatures as the albite-epidote facies. Though it is named for the mineral hornblende, the

appearance of that mineral is not constrained to this facies. The hornblende-hornfels facies has the following mineral assemblages:

In metabasites:

hornblende + plagioclase ± diopside, anthophyllite/cummingtonite, quartz

In metapelites:

muscovite + biotite + andalusite + cordierite + quartz + plagioclase

In K₂O-poor sediments or meta-igneous rocks:

cordierite + anthophyllite + biotite + plagioclase + quartz

In Si-rich dolostones:

dolomite + calcite + tremolite ± talc

Pyroxene-hornfels facies

The pyroxene-hornfels facies is the contact-metamorphic facies with the highest temperatures and is, like the granulite facies, characterized by the mineral orthopyroxene. It is characterized by the following mineral assemblages:

In metabasites:

orthopyroxene + clinopyroxene + plagioclase ± olivine or quartz

In metapelites:

cordierite + quartz + sillimanite + K-feldspar (orthoclase) ± biotite ± garnet

(If the temperature is below 750 °C there will be andalusite instead of sillimanite)

cordierite + orthopyroxene + plagioclase ± garnet, spinel

In carbonate rocks:

calcite + forsterite ± diopside, periclase

diopside + grossular + wollastonite ± vesuvianite

Sanidinite facies

The sanidinite facies is a rare facies of extremely high temperatures and low pressure. It can only be reached under certain contact-metamorphic circumstances. Due to the high temperature the rock experiences partial melting and glass is formed. This facies is named for the mineral sanidine. It is characterized by the following mineral assemblages:

In metapelites:

cordierite + mullite + sanidine + tridymite (often altered to quartz) + glass

In carbonates:

wollastonite + anorthite + diopside

monticellite + melilite \pm calcite, diopside (also tilleyite, spurrite, merwinite, larnite and other rare Ca- or Ca-Mg-silicates).